

An Improved Method of Potato Seed Treatment

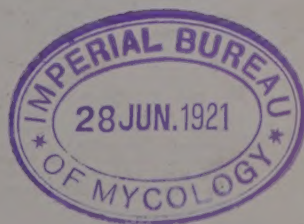


A $2\frac{1}{2}$ bushel sack of seed potatoes, variety Irish Cobblers, sorted into two lots, those diseased and those healthy. Black scurf, Black leg, Dry rots and Common scab are the diseases. Seed treatment eliminates some and materially reduces others.

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AN IMPROVED METHOD OF POTATO SEED TREATMENT

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Half of the seed potatoes that are planted each spring are infected with some plant disease. Black leg, Black scurf, Common scab, and Dry rots are the commonest of these diseases. They cut down the stand, injure the roots, mar the potatoes and reduce the yield. Illustration on cover shows the seed potatoes from a 2½ bushel sack bought in the open market, sorted into two lots: those free from disease and those not free. Note that there are more diseased potatoes than healthy ones. This is not an unusual case; in fact, it is somewhat better than the average. Such potatoes can be made into good seed by treating them, but seed treatment will not make good seed out of culls. The little potatoes and those badly diseased should be discarded for seed purposes.

THE COMMON SEED POTATO DISEASE

Black leg is most severe on the early varieties and it is not uncommon to find from 2 to 15 per cent of the hills killed by



Fig. 1. Black scurf is evident as black dirt-like particles adhering to the tuber. These are masses of fungus threads (sclerotia) which enable the parasite to live over winter and attack the roots and stems again in the spring. Seed treatment kills them.



Fig. 2. Common scab is very conspicuous on the tuber. The scab spots are favorable places for wire worms and insects to feed. Often the spots become very deep under such conditions. This disease lives over on the seed potato and can be controlled by treatment.

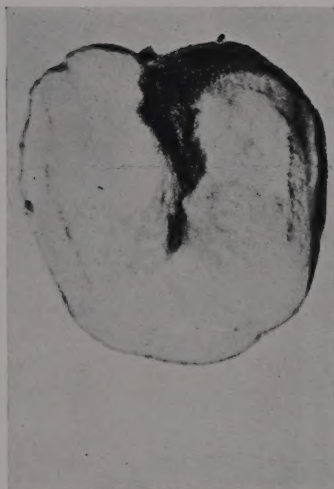


Fig. 3. A black leg infected tuber laid open so as to show the discoloration caused by the disease. Such tubers not only carry the disease over from one year to another but infect others while in the bin. Seed treatment will save those that have the germ clinging to the surface of the seed potato.

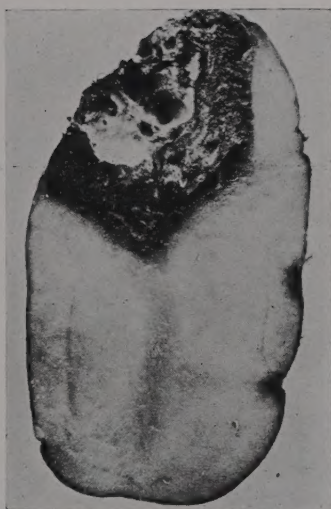


Fig. 4. This seed potato was injured at harvest time and placed in poor storage in the fall. The rot started in the wound. It is not safe to cut out the rotten part and plant the rest. Such potatoes contaminate others in the bin.

this disease before the crop is half mature. It is carried over winter in and on the seed and not in the soil. (See fig. 3.)

Black scurf (fig. 1) attacks both early and late varieties. It rots off the roots, girdles the stems and stunts the plant, so that only small potatoes result. Its effect on the roots and stems is shown in fig. 5. It forms dirt-like specks (sclerotia) on the ripe potatoes. It lives over in the soil as well as on the seed.

Common scab is very prevalent on our seed stock and annually more of our soils are becoming infested. A scabby crop of potatoes means no profit. They are classed as culls by the dealers and as undesirable by the housewife. (See fig. 2.)

Many of the potatoes put in the cellar decay before spring, due to storage rots, such as shown in fig. 4. These decay organisms are carried into the cellar in the fall and out in the spring on the seed.

SEED TREATMENT

Seed treatment will reduce the above losses and increase the yield, at only a small expense. The usual method of seed treatment consists of soaking the seed from $1\frac{1}{2}$ to 2 hours in

either corrosive sublimate or formaldehyde solution and then allowing it to dry. This is time-consuming and not conducive to rapid progress at a time of the year when the crop must be planted. As a result the grower all too often omits seed treatment and takes his chances on the crop.

HOT FORMALDEHYDE

Recently the treatment has been so modified as to make it unnecessary to practice the long soaking. The potatoes are merely dipped for 2 minutes in hot formaldehyde solution and allowed to dry. Its efficiency has been demonstrated experimentally in the laboratory and in the field for the past three years. Formaldehyde is more active hot than cold. It penetrates faster and kills more rapidly. This modification in the standard method of seed treatment should make it practical

for every potato grower to treat his seed and thereby increase his yield and profit.



Fig. 5. Here the black scurf fungus has destroyed the outside tissues of the stem on the right while the one at the left has escaped without much injury. Notice the stolon bearing the tuber has rotted off.

THE SOLUTION

Formaldehyde (40 per cent solution) 2 pints.

Water, 30 gallons.

Dip 2 minutes at 118 degrees to 122 degrees F.

Pile 6 to 8 inches deep and cover with the wet sacks for 60 minutes and then allow to dry.

METHODS

Small lots of potatoes can be readily treated in a common 15 gallon wash boiler or similar metal tub on an ordinary cook stove. The solution is made up and placed in the boiler over the open fire un-

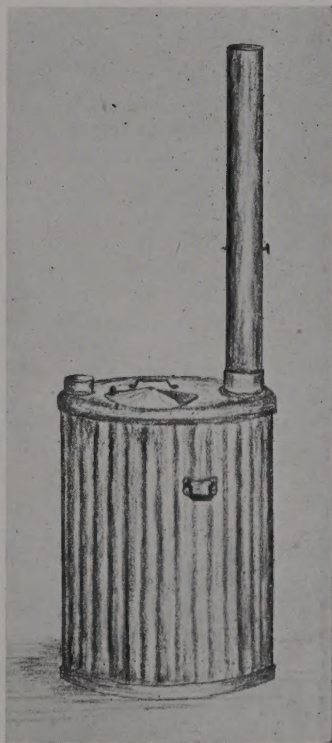
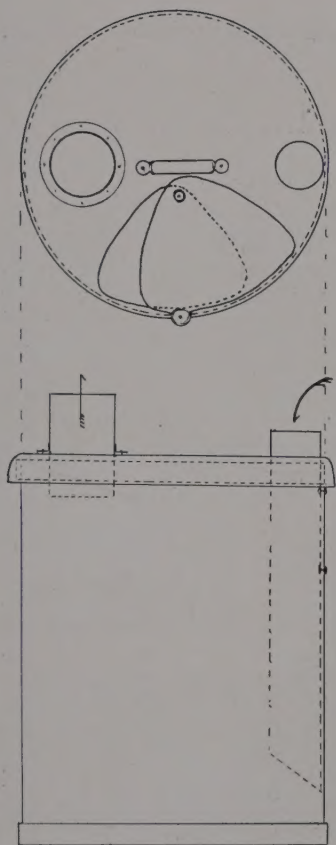


Fig. 6. A simple heater suitable for warming 50 to 60 gallons of the solution. It may be made out of an ordinary ash can.

til it is heated to 122 degrees F. when the boiler is set on the floor and the potatoes immersed in half-bushel lots in a gunny sack. If the solution becomes too cool, as it probably will, it can be placed over the open fire.

With larger lots the treatment can best be made in a 60 to 80 gallon tank or a hogshead cut in two, in which is placed a sheet iron heater such as shown in fig. 7.

This heater can be made as follows: Into a No. 14 ash can, 24 inches high and 18 inches in diameter, is inserted a piece of eavestrough tubing as a draft flue. This flue opens through the cover. Another hole is cut in the cover for a four foot chimney made of similar tubing. Between the flue and the chimney a third opening in the cover permits the introduction

of wood or coal for the fire. A diagram of the heater is shown in fig. 6.

Its cost is approximately:

Ash can	\$3.00
Eavestrough tubing	.50
Plumbing and labor	3.00
	\$6.50

Dry, well-split wood is the best fuel for a quick, hot fire. The tank is placed directly into the solution and when the temperature reaches 122 degrees F. the potatoes are immersed. They should remain in the solution 2 minutes and then the next lot immersed and so on until the whole is finished. Care should be taken that the temperature is maintained between 118 and 122 degrees F. during the process.

If the quantity of potatoes to be treated warrants it, they may be disinfected effectively in a larger tank. The solution is heated by steam from a small upright boiler. The potatoes may be dipped while in the crates and allowed to dry without emptying. It is advisable to cover them with sacks or canvas for 60 minutes before drying. (fig. 8.)



Fig. 7. Seed potatoes may be treated by the hot formalin method by using an improvised heater set in a wooden tank 4 feet long, 1 2-3 feet wide and 2½ feet deep: capacity about 60 to 80 gallons when ready for operation.

The most rapid way of treating is to use a tank in which is laid a corn crib extension elevator, such as used for unloading corn on the farm into the crib. The endless chain draws the potatoes through the solution. The tank is 14 feet long, 2½ feet deep, and 1 2-3 feet wide, built of two inch plank. Such a tank will hold about 400 gallons of formaldehyde solu-



Fig. 8. A small steam boiler of the upright type was also found to supply sufficient steam to maintain a temperature between 118 and 122 degrees F. Potatoes were dipped in crates. This method was used to treat enough seed for 20 acres by Sam Kennedy of Clear Lake, Iowa. He raised a good clean crop of potatoes.

tion when ready for operation. The elevator is laid in the tank wrong end to and a wooden crank fastened to the cog wheel at



Fig. 9. Where large quantities are to be treated this device may be used effectively. This shows the tank, extension corn crib elevator and the connection with the steam tractor.

the side. The length of time that the tubers are washed is determined by the man at the crank. The solution in the tank can be heated by means of steam from a steam tractor such as is used in threshing small grain. This machine is shown in fig. 9.

With such a machine 500 bushels may be treated in one day. It can be operated efficiently with two men placing the potatoes into the tank, one wheeling them away in a wheelbarrow and another turning the crank. The machinery and methods described above have been used with satisfactory results by the authors for the past three years.

The circumstances of the individual grower must in large part determine the way this treatment is carried out. Some may have on hand other suitable equipment.

IS THERE INJURY TO GERMINATION

Formaldehyde solution at 122 degrees F. does not injure or delay germination according to trials made in the field during the past three years. However, it should be remembered that a dose is a dose and the recommendations as outlined must be followed.

PRECAUTIONS

Temperature—The solution should not be allowed to get warmer than 122 degrees F. nor should the potatoes be immersed when the temperature is below 118 degrees F. Too hot a solution will injure or delay germination of the tubers. Too cold a solution will not control the diseases.

It is essential to have a fairly accurate thermometer. The cheap 15 cent thermometer made with spirits instead of mercury is not reliable and must not be used. A mercury column thermometer registering at least 130 degrees F. is necessary. These can usually be secured at a hardware store for about \$1.00. A still better type of instrument is the floating thermometer such as is used in creameries. These are quite accurate and convenient to use. They cost 75 cents to \$1.25 each, depending upon the temperature range.

Strength of solution—Make up the solution according to the directions. It is well to make up a reserve supply of the formaldehyde solution to have on hand for maintaining the initial strength and lowering the temperature, should it go above 122 degrees F. In the progress of treating, the quantity of solution decreases due to the wetting and loss by draining of the potatoes. The original quantity therefore, should be maintained throughout the process by replacement from the reserve supply. Such replacement will maintain the initial strength. The formaldehyde solution does not weaken thru evaporation.